



# Field Service Procedure

Part Number: SP00180

Rev: E

Date: 23 February 2004

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## Narkomed MRI PMC Procedure

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## 6.0 PMC Procedure, Narkomed MRI

The procedures in this section shall be performed in their entirety each time a component is removed, replaced, calibrated, adjusted and during all scheduled Periodic Manufacturer's Certification (PMC) visits. A PMC Checklist form, P/N 4114551, available from the Draeger Medical, Inc. Technical Service Department, shall be completed by the Technical Service Representative each time a PMC is performed. Space is also provided on the PMC checklist form to record the results of a vapor concentration test.

NOTE: Test equipment listed below with an asterisk (\*) requires calibration at a maximum interval of one year. Verify the dates on test equipment calibration labels. DO NOT USE any test equipment with an expired calibration date. Notify your supervisor immediately if any equipment is found to be out of calibration.

In the space provided at the bottom of the PMC checklist form, record the Model and EL number of all calibrated test equipment used. Also record the calibration due dates.

### Test Equipment Required:

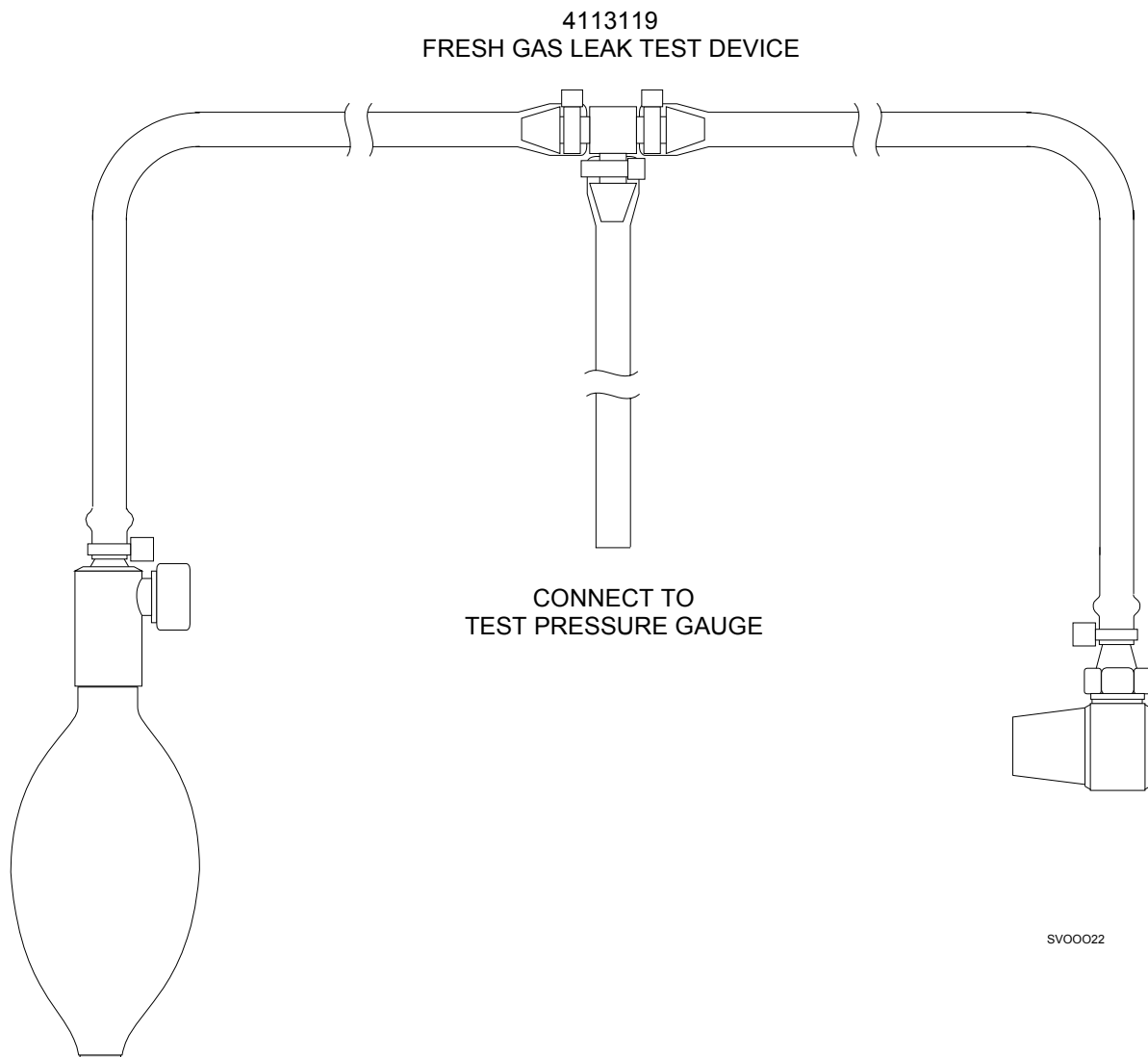
- \*-- Multi-Meter (Fluke or Equivalent)
- \*-- Electrical Safety Analyzer (Biotek 501 Pro or Equivalent)
- \*-- Test Pressure Gauge, P/N S000063
- Fresh Gas Outlet Volume Test Device, P/N S010158
- Fresh Gas Leak Test Device, P/N 4113119
- Adapter Assembly, Test Terminal, P/N 4104389
- \*-- Flowmeter Test Stand (Capnomed), P/N S000081
- Breathing System Leak Test Device, P/N S010159
- Dow Corning High Vacuum Grease, P/N S4105908
- Tube, Corrugated, 22 mm x 12 in. long, P/N 9995112
- Breathing Bag, 3 liter, P/N 9995330
- Baromed Pressure Test Fixture
- \*-- Test Minute Volume Meter, P/N 2212300 (or Equivalent)
- \*-- Digital Pressure Manometer (SenSym PDM 200CD or Equivalent)
- \*-- Riken Gas Indicator, Model 18
- Stop Watch
- Test Lung (P/N 8401892)

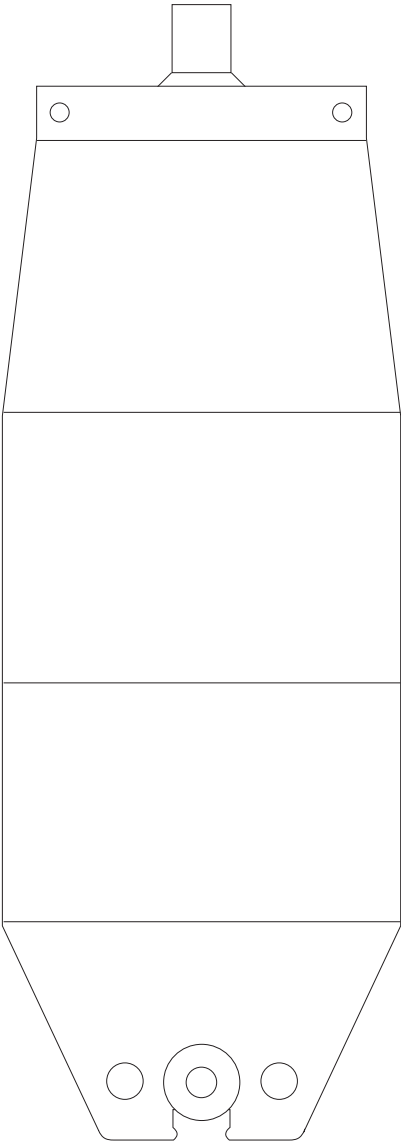
Test equipment illustrations are shown on following pages.

**WARNING:** Always lock the casters after this anesthesia machine has been positioned in the MRI scanner room. Magnetic attractive forces between the magnet and the anesthesia machine may cause unintentional movement of the anesthesia machine if the casters are unlocked.

**WARNING:** The power supply charger assembly must not be taken into the magnet room. Damage to the equipment, MRI system, or personal injury could result.

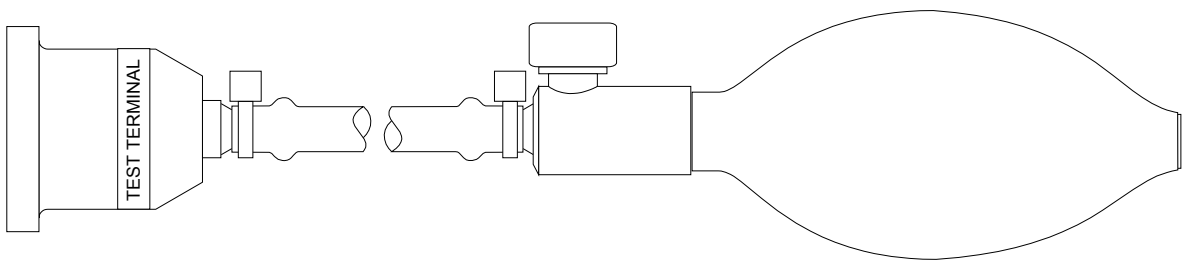
**WARNING:** The anesthesia machine must be removed from the MRI scanner room before servicing the machine. Do not enter the MRI scanner room with any tools or instruments. These items may be strongly attracted to the magnet and may cause serious injury or death when brought into an MRI scanning room.



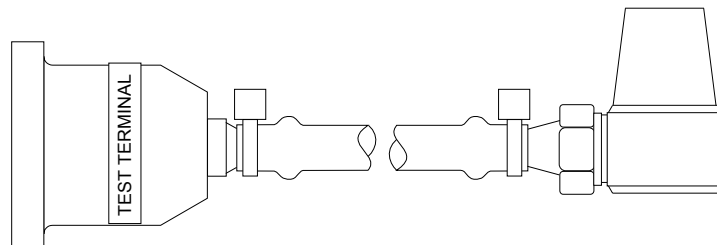


8401892  
SIEMENS TEST LUNG

SV00025



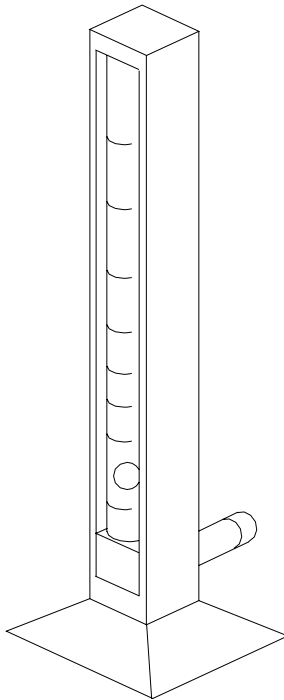
S010159  
BREATHING SYSTEM LEAK TEST DEVICE



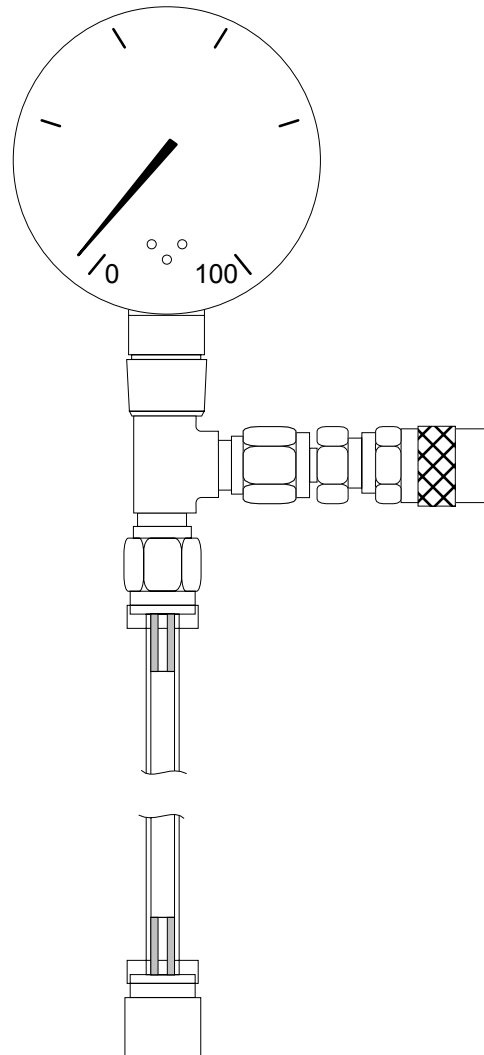
SV00023

S010158  
FRESH GAS OUTLET VOLUME TEST DEVICE

SV00027

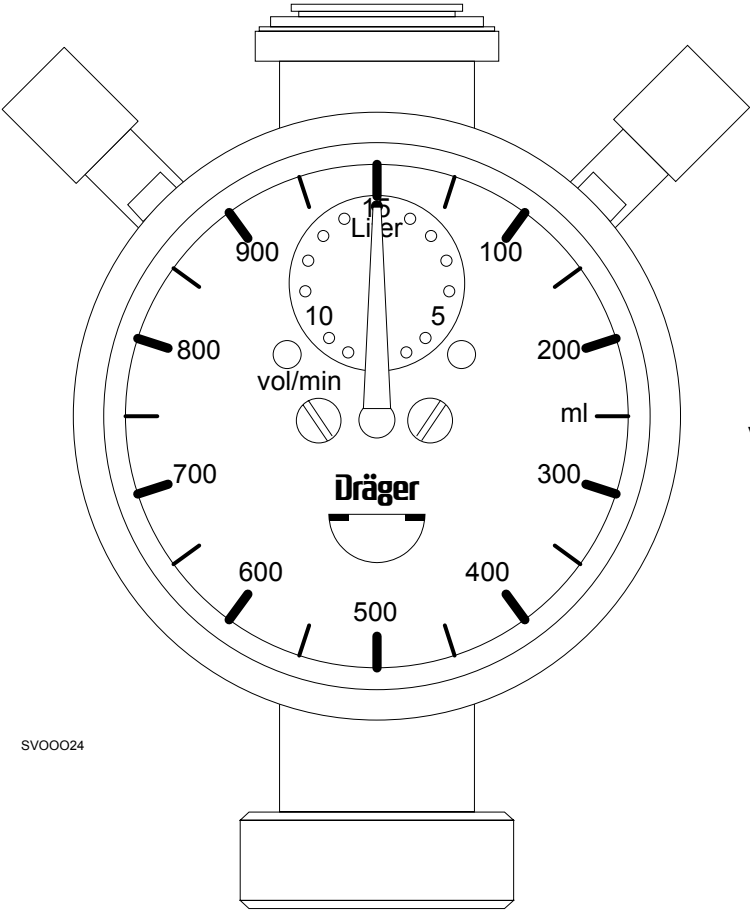


S000081  
FLOW METER  
TEST STAND

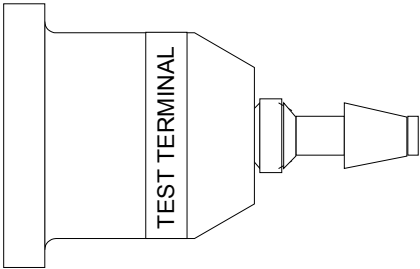


S000063  
REGULATOR TEST  
PRESSURE GAUGE





2212300  
MINUTE  
VOLUMETER



4104389  
TEST TERMINAL  
ADAPTER

## Periodic Manufacturer's Certification General Instructions

The purpose of these procedures is to provide detailed instructions for performing a Periodic Manufacturer's Certification (PMC) inspection the Narkomed MRI anesthesia machine.

A PMC consists of a complete Periodic Manufacturer's Service procedure and a certification level inspection based on Draeger Medical, Inc. Recommendations and equipment performance. Additional inspections are also performed to insure proper product labeling.

Several additional documents have been created to ensure the success of this new program. Following is a brief description of the purpose of each document.

### Field Service Procedure:

Periodic Manufacturer's Certification Forms - Part Number SP00175.

This procedure illustrates sample checklists with typical periodic maintenance items filled in, including vapor concentrations verification tests, parts replaced, general comments and certification levels. Also included are sample PMC labels marked to show several levels of certifications. An excerpt from DMI's *Anesthesia System Risk Analysis and Risk Reduction* is included, and also a sample of an Executive Summary to be furnished to the hospital's Risk Manager or Chief of Anesthesia.

### Field Service Procedure:

DMI Recommendations Guidelines Index Anesthesia Systems - Part Number S010250.

This Guideline was created to provide an assessment of each machine's certification. It contains various comprehensive overviews of possible equipment conditions and their associated certification levels.

The first list in the Recommendation Guidelines is a reference chart for machine certification based on equipment status. The second is an abbreviated summary of all DMI Recommendations and Failure Codes including the Condition Number, Equipment Condition, Recommended Corrections, Certification Code, and Tests Affected when applicable.

There is also a matrix classified as "Failure Codes" which identifies the correct manner in which to document equipment tests that fail, or were unable to be performed due to circumstances beyond the control of the service technician performing the inspection. (Ex: Air cylinder supply is unavailable to perform Air High Pressure Leak test.) The Failure Codes section also indicates suggested resolution of the situation. Failure Code numbers begin at 34 and use the same certification levels strategy, and carry the same weight as DMI Recommendation equipment condition codes.

The final matrix is the most comprehensive index sorted by machine model and includes Equipment Condition, Certification Code, and DMI Recommendations. It also specifies any suggested upgrade path including ordering information that should be taken such as installing a Bellows with Pressure Limit Control 4109664-S01 Kit, after market modification kit to a machine not equipped with pressure limit control.

The letters A, B, C, D and the Roman Numerals I, II are used as codes in the individual matrix for each model of anesthesia machine. The letters A, B, C, and D are used in descending order to indicate the certification level of the equipment. They are as follows:

- A = Certified
- B = Certified with Recommendations
- C = Conditionally Certified
- D = No Certification

Roman Numerals I and II do not affect the certification level but rather are provided to give further instructions to the end user as follows:

I = The system in its present configuration shall only be used with a CO2 monitor incorporating an apnea warning. The operator of the system is advised to frequently scan the CO2 readings and alarm thresholds.

II = The present configuration of equipment requires that the unit operate at all times with an oxygen analyzer that includes a low oxygen warning. The operator of the system is advised to frequently scan the oxygen readings and alarm limits.

Following is an explanation of machine certification levels:

**Certified-** No recommendations apply to machine being inspected. (Only item number 33 - "No Recommendations" shall apply for this certification level.)

**Certified with Recommendations-** A numbered recommendation with a code of B applies to the machine being examined.

**Conditionally Certified-** A numbered recommendation with a code of BCI or BCII applies to the machine being examined.

**No Certification-** A numbered recommendation with a code of D applies to the machine being examined.

When multiple recommendations apply, "No Certification" would take precedence over "Conditionally Certified" and "Certified with Recommendations". "Conditionally Certified" would take precedence over "Certified with Recommendations".

For example:

A **Narkomed 3** could have recommendation number 21 and failure code 61.1 apply.

21 - No ventilator pressure limit control. Code is B.

61.1 - Enflurane agent is unavailable to test. Code is BC.

Correct certification for this machine is BC, which means **CONDITIONALLY CERTIFIED WITH RECOMMENDATIONS**.

A **Narkomed 4** could have recommendation numbers 14 and 21 apply.

14 - CO<sub>2</sub>/Agent monitor exhaust port is not properly connected to the waste gas scavenger. Code B.

21 - No ventilator pressure limit control. Code B.

The correct certification for this machine is B, which means **"CERTIFIED WITH RECOMMENDATIONS"**.

A **Narkomed 2B, 2C** or **GS** could have recommendation 30 apply.

30 - Anesthesia machine is equipped with inhalation anesthesia vaporizers without an agent analyzer in the breathing system. Code B.

The correct certification for this machine is B, which means **"CERTIFIED WITH RECOMMENDATIONS"**.

A **Narkomed 6000** could have no NAD recommendations or failure codes apply. The correct certification level for this machine is Code A, **"CERTIFIED"**.

**Code D, which means "NO CERTIFICATION", also means the machine shall not receive a Periodic Manufacturer's Certification label. The machine shall also receive a "WARNING - This System is Not Certified" label, P/N 4114857. This label shall be placed at a prominent location on the right side of the machine after all other previous PM and "Vigilance Audit® Validation" labels have been removed.**

### PM Certification Procedure for Narkomed MRI Anesthesia System

1. Use the PM Certification form for Narkomed MRI Anesthesia Systems (P/N 4114551).
2. Completely fill in the header information.
3. Replace the VENTILATOR RELIEF VALVE DIAPHRAGM in accordance with SP 00075. Place a check mark and the replacement date at "VENT VALVE REPLACEMENT" line on the Periodic Manufacturer's Certification form.
4. Check all vapor 19 and 19.1 vaporizers for correct labeling. All vaporizers must have a label stating "THE CONCENTRATION OUTPUT OF THIS VAPORIZER SHALL BE VERIFIED AFTER IT HAS BEEN ATTACHED TO THE ANESTHESIA MACHINE" (part # S010015). This label shall be attached to the rear of the vaporizer directly below the mount.
5. All Key Index Safety Systems vaporizers, (K.I.S.S.) must have a label stating "CAUTION: AFTER FILLING HAS BEEN COMPLETED, REINSERT PLUG INTO UPPER FILLER PORT AND TIGHTEN LOCKING SCREW" (part # 4112520-001). This label shall be attached to the vaporizer directly above the keyed filler. Place a check mark at "K.I.S.S. LABEL" on the PM Certification form.
6. If machine is equipped with a HALOTHANE Dräger Vapor 19 or 19.1 vaporizer, determine if vaporizer must be inspected for soil condition one. Check the serial number plate located on the rear of the vaporizer for a plus (+) preceding the serial number. A HALOTHANE vaporizer serial number not preceded with a (+) must be tested for soil in accordance with SP00073. If vaporizer does not need to be inspected, indicate so with a plus (+) next to the "Vapor Inspection (H)" line on the Vigilance Audit form. If vaporizer is soil condition 0, indicate so with "SOIL 0" written next to the "Vapor Inspection (H)" line on the Vigilance Audit form. If vaporizer is soil condition one, indicate so with "SOIL 1" written next to the "Vapor Inspection (H)" line on the Vigilance Audit form. Place a "CAUTION DO NOT USE" label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the equipment operator to remove the failed vaporizer from the machine and apply a replacement vaporizer or an adapter block onto the mount. All "SOIL 1" vaporizers must be removed from service for machine to receive certification.
7. Perform the vapor concentration test on all Dräger vapor vaporizers in accordance with SP00073. For every vaporizer tested, fill out a "VAPOR VAPORIZER CALIBRATION CHECK" label (part # S010016). Information on this label shall include your signature, type of agent, date tested, test results @ 1%, 2.5%, 4%, and a PASS or FAIL indication. This label shall be attached to the upper right side of the vaporizer. If vaporizer fails the concentration test, check "NO" in the "RECOMMENDED FOR USE" section on the PM Certification form.

Place a "CAUTION DO NOT USE" label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the equipment operator to remove the failed vaporizer from the machine and install a replacement vaporizer or an adapter block onto the mount. All nonfunctional Dräger vapor vaporizers must be removed from service for machine to receive certification.

### PM Certification Procedure for Narkomed MRI Anesthesia System

8. Proceed with PM Certification procedure. If any tests fail refer to the "Failure Codes" listing in DMI Recommendations Guidelines Index (P/N S010250) to determine correct certification level starting point. Failure codes shall be documented on the "RECOMMENDATIONS / GENERAL COMMENTS" section of the PM Certification form and on the Executive Summary. If a test fails that has not been identified by the "Failure Codes" list, consult with Draeger Medical, Inc. to assess the proper certification level.
9. Based on the "EQUIPMENT CONDITION" inspect the machine for any "DMI RECOMMENDATIONS" that would apply. Use the Narkomed MRI section of the "DMI RECOMMENDATION GUIDELINES INDEX" (P/N S010250). Note all applicable DMI recommendations on the Executive Summary. NOTE: If using a carbon form, indicate the Equipment Condition number and to see reverse side under the "RECOMMENDATIONS / GENERAL COMMENTS" section of the form.
10. Determine the correct certification level of the machine based on the combined lowest common denominator of "Equipment Conditions" and "Failure Codes". If the machine is at least conditionally certified fill out the "PM CERTIFICATION" label. Check the box(s) on the validation label where appropriate. Write the month and year, (three months from date of PM Certification) next to "NEXT VISIT DUE:" If certification level is "D", machine shall not receive a "PM CERTIFICATION" label. Any machine not receiving a PM Certification label shall receive a "WARNING NOT CERTIFIED" label. This label shall be placed at a prominent location on the left side of the machine after all other previous PMC and Vigilance Audit Validation labels have been removed.
11. In the "CERTIFICATION LEVEL" section of the PM Certification form, record the last visit certification level, the current certification level and the next visit due month and year, (three months from date of PM Certification) in the spaces provided.
12. If applicable, remove the previous PM CERTIFICATION VALIDATION label and attach the new label (P/N S010006 w/phone #, or P/N S010007 w/o phone #) in a prominent location on the rear of the anesthesia machine.
13. Check the appropriate boxes on the "PM CERTIFICATION NOTICE" label, (part # S010011). If the machine is not certified, the last box of this notice label shall be marked. Attach this notice to the flow shield of the anesthesia machine.
14. Have the customer sign each PM Certification form or the Executive Summary, and review the equipment conditions and the recommendations with the customer.
15. Return top copy to Draeger Medical, Inc. Service Department, keep middle copy for service organization records, give bottom copy to customer.

## **6.1 Safety Testing**

### **6.1.1 Circuit Isolation Test**

- 6.1.1.1 Turn the System Power switch to STANDBY, remove the AC power cord from the outlet.
- 6.1.1.2 Set a multimeter to its highest resistance range, and carefully check for continuity between Pin 1 of the machine power connector located at the rear of the machine and any exposed unpainted surface of the machine chassis. There shall be no continuity between these points.
- 6.1.1.3 Reconnect the power cable to the machine power connector.

### **6.1.2 Protective Ground Continuity Test**

**NOTE:** Do not plug the safety analyzer into a line isolation monitor as inaccurate readings may occur.

- 6.1.2.1 Plug the Biotec 501 Pro power cord into a live receptacle; place the power switch of the Biotec 501 Pro to the "1" or ON position and ensure that the keys marked GROUND, NEUTRAL and POLARITY are in the NORMAL position.

**NOTE:** If the corresponding red LEDs for GND, NEU and POL are not lighted, they are in the normal position.

- 6.1.2.2 Attach the ground lead from the red Test Lead input to the ground hole of the AC test receptacle on the Biotec 501 Pro. Select the Single Lead condition by ensuring that the SINGLE/DUAL key is not illuminated. Press the gray key marked RESIST, then press the blue key marked CAL. When the word CAL is no longer shown in the display window of the Biotec 501 Pro, you may proceed.
- 6.1.2.3 Remove the red lead from the ground hole of the AC test receptacle and attach the alligator clip to the free end, leaving the other end plugged into the red Test Lead input of the Biotec 501 Pro with the Single Lead and Resistance conditions still selected. Attach the alligator clip to any exposed unpainted surface of the machine chassis.
- 6.1.2.4 Plug the charger cord into the test receptacle of the 501 Pro. The resistance reading then shown on the Biotec 501 Pro display is the Chassis Resistance. Bend and exercise the power cord to check for intermittent readings. Record the reading on the PMC form. ( $\leq 0.1$  ohm)

### 6.1.3 Chassis Leakage Current Test

- 6.1.3.1 Press the gray Leakage key. Leave all other selections from the previous test the same.
- 6.1.3.2 Set the white keys on the Biotec 501 Pro labeled GROUND, NEUTRAL and POLARITY for normal polarity. Record the reading on the PMC form. (0  $\mu$ A)
- 6.1.3.3 Set the white keys for NORMAL ground, OPEN neutral and NORMAL polarity. Verify reading is zero. (0  $\mu$ A)
- 6.1.3.4 Set the white keys for OPEN ground, NORMAL neutral and NORMAL polarity. Record the reading on the PMC form. Note: Old power supply:  $\leq 150$   $\mu$ A but not zero. New power supply:  $\leq 120$   $\mu$ A but not zero.
- 6.1.3.5 Set the white keys for NORMAL ground, NORMAL neutral and REVERSE polarity. Record the reading on the PMC form. (0  $\mu$ A)
- 6.1.3.6 Set the white keys for NORMAL ground, OPEN neutral and REVERSE polarity. Verify reading is zero. (0  $\mu$ A)
- 6.1.3.7 Set the white keys for OPEN ground, NORMAL neutral and REVERSE polarity. Record the reading on the PMC form. Note: Old power supply:  $\leq 150$   $\mu$ A but not zero. New power supply:  $\leq 120$   $\mu$ A but not zero.
- 6.1.3.8 Return the white keys on the Biotec 501 Pro to their Normal positions.

## 6.2 Self-Diagnostics: Core-M Monitor

- 6.2.1 Connect the pipeline supply or open the cylinders.
- 6.2.2 Turn the System Power switch to ON.
- 6.2.3 Verify that the Omicron monitor LCD display and LED lamps performs a self-diagnostic test.
- 6.2.4 Verify that the green "Power" LED activates.



## 6.2A Self-Diagnostics: VPO Monitor

- 6.2.A.1 Connect the pipeline supply or open the cylinders.
- 6.2.A.2 Turn the System Power switch to ON.
- 6.2.A.3 Verify that the following is displayed:

```
NARKOMED MRI
COPYRIGHT 2000 DRAEGER MEDICAL, INC.
VERSION:      1.00 NM MRI
SOFTWARE ID:   3B31

DIAGNOSTIC TESTS

FIRMWARE                PASS
RAM                     PASS
VIDEO                   PASS
A/D CONVERTER           PASS
AUDIO                   PASS
CLOCK                   PASS
NON-VOLATILE MEMORY     PASS


PERIODIC CERTIFICATION DUE
FUNCTIONAL
```

- (✓) 6.2.A.4 Record the machine software version on the header of the checklist form.

## 6.2B CONFIGURATION: VPO Monitor

- 6.2B.1 Press the CONFIG key.
- 6.2B.2 The CONFIGURE screen is displayed.
- 6.2B.3 Verify the correct Time and Date.

**6.2C SERVICE DATA: VPO Monitor**

- 6.2C.1 Press and hold the Oxygen High Limit key and the Volume Low Limit key, and then press the  key.
- 6.2C.2 The Main Service Screen appears.
- (✓) 6.2C.3 Record the Last Service Date on the PMC form.
- (✓) 6.2C.4 Record the Hours Run Since Last Service on the PMC form.
- (✓) 6.2C.5 Record the Total Hours Run on the PMC form.
- 6.2C.6 Select and enter the Service Log.
- 6.2C.7 Verify any pertinent information from the Service Log. Contact the Draeger Medical, Inc. Technical Service Department if necessary.
- 6.2C.8 Press EXIT to return to the Main Service screen.
- 6.2C.9 Select the SRVC Service Code.
- 6.2C.10 Select and enter your Technical Service Rep. I.D. number.
- (✓) 6.2C.11 Press the RESET key. This resets the last service date to the current date and resets the hours run since last service to zero.
- 6.2C.12 Press the PMS SCHED key.
- (✓) 6.2C.13 Select and enter the month of the next service due date. The internal clock of the machine limits the amount of date advance to a maximum of six months from the current service date.

### 6.3 Battery Circuit Test

- 6.3.1 Deleted
- 6.3.2 If needed, replace the battery as outlined in the Battery Replacement Procedure in Section 4 of this manual/
- 6.3.3 Is "ON" LED lighted? \_\_ (Y)
- 6.3.4 With the System Power switch ON, unplug the AC power cord.
- 6.3.5 Is yellow "AC PWR FAIL" LED lighted as long as the power cord is unplugged? \_\_ (Y)
- 6.3.6 Press and hold the "BATTERY TEST" button.
- 6.3.7 Is green Battery Test LED lighted as long as "BATTERY TEST" button is depressed? \_\_ (Y)
- 6.3.8 Release the "BATTERY TEST" button.
- 6.3.9 Restore AC power to the machine.
- 6.3.10 Does the "AC PWR FAIL" LED extinguish? \_\_ (Y)

## **6.4 High Pressure Leak Test**

### **6.4.1 Yoke Assemblies**

6.4.1.1 Turn the ventilator off.

6.4.1.2 Turn the System Power switch to STANDBY.

6.4.1.3 Disconnect the pipeline supply or close the cylinders.

6.4.1.4 Remove cylinder or yoke plug from each yoke assembly.

6.4.1.5 Do all the yoke handles adjust smoothly? \_\_\_\_ (Y)

6.4.1.6 Are the two (2) yoke pins installed securely in each yoke? \_\_\_\_ (Y)

6.4.1.7 Is there only one (1) cylinder washer on each yoke assembly? \_\_\_\_ (Y)

6.4.1.8 Is there a yoke plug attached to each yoke assembly? \_\_\_\_ (Y)

6.4.1.9 Is the proper gas I.D. label affixed to each yoke assembly? \_\_\_\_ (Y)

6.4.1.10 Attach a cylinder to each yoke assembly, open the cylinder valve, let the pressure stabilize, close the cylinder valve, and remove the cylinder from the yoke assembly.

6.4.1.11 Does the yoke check valve assembly prevent the escape of excessive pressure? \_\_\_\_ (Y)

6.4.1.12 Attach the cylinders to the yokes.

6.4.2 Oxygen High Pressure Leak Test

- 6.4.2.1 Disconnect the pipeline supplies.
- 6.4.2.2 Turn the System Power switch to STANDBY.
- 6.4.2.3 Open the oxygen cylinder valve.
- 6.4.2.4 Let the pressure stabilize.
- 6.4.2.5 Close the oxygen cylinder valve and remove the cylinder.
- 6.4.2.6 Observe the oxygen cylinder pressure gauge.
- 6.4.2.7 After two (2) minutes, what is the pressure loss? \_\_\_\_ PSI (<50)
- 6.4.2.8 Attach the cylinder.

6.4.3 Nitrous Oxide High Pressure Leak Test

- 6.4.3.1 Turn the System Power switch to ON.
- 6.4.3.2 Open one (1) oxygen cylinder valve and one (1) nitrous oxide cylinder valve.
- 6.4.3.3 Adjust the oxygen flow to 8 l/min.
- 6.4.3.4 Let the pressure stabilize.
- 6.4.3.5 Close the nitrous oxide cylinder valve and remove the cylinder.
- 6.4.3.6 Observe the nitrous oxide cylinder pressure gauge.
- 6.4.3.7 After two (2) minutes, what is the pressure loss? \_\_\_\_ PSI (<50)
- 6.4.3.8 Attach the cylinder.
- 6.4.3.9 Close the oxygen flow control valve.

## **6.5 High Pressure Regulator Test**

- 6.5.1 Disconnect all pipeline hoses and set the System Power switch to ON.
- 6.5.2 Close all cylinder valves except the O<sub>2</sub> valve.
- 6.5.3 Set the oxygen flow to 5 liters per min.
- 6.5.4 Open the other gas flow control valves to drain pressure from the system.
- 6.5.5 Close the O<sub>2</sub> cylinder valve, and close the flow control valves. Press the O<sub>2</sub> Flush valve to drain oxygen pressure from the system.
- 6.5.6 Set the System Power switch to STANDBY.
- 6.5.7 Remove the table top from the machine.
- 6.5.8 Locate the TEE fitting in the ¼ in. diameter O<sub>2</sub> regulator output line, and remove the plug from the TEE fitting.
- 6.5.9 Connect a dedicated O<sub>2</sub> test gauge to the TEE fitting.

NOTE: Two test gauges are required to avoid contamination of the O<sub>2</sub> circuit from the other gases: a dedicated test gauge for O<sub>2</sub>, and a second test gauge for the other gases.

- 6.5.10 Open the O<sub>2</sub> cylinder valve and set the System Power switch to ON.
- 6.5.11 Set the oxygen flow to 4 liters per min.
- 6.5.12 On the test gauge, what is the regulator output pressure? \_\_\_\_PSI (42-48)

NOTE: Leave the dedicated O<sub>2</sub> test gauge connected for later use in the Oxygen Supply Pressure Alarm Test.

- 6.5.13 Set the System Power switch to STANDBY.
- 6.5.14 For the other pressure regulators, locate their corresponding TEE fittings in the ¼ in. diameter regulator output line, and remove the plug from the TEE fitting (one at a time).
- 6.5.15 Connect the second test gauge to the TEE fitting.
- 6.5.16 Open the corresponding cylinder valve and set the System Power switch to ON.

- 6.5.17 Set the corresponding flow to 4 l/min. (900 ml/min. for CO<sub>2</sub>).
- 6.5.18 On the second test gauge, what is the regulator output pressure? \_\_\_\_ PSI (42 - 48), (27 - 33 for CO<sub>2</sub>)
- 6.5.19 Depressurize the gas circuit.
- 6.5.20 Remove the test gauge and replace the plug in the TEE fitting.
- 6.5.21 Repeat the test for all other gases.

## 6.6 Gauges

### 6.6.1 Cylinder Gauges

- 6.6.1.1 Are the pressure gauges correct for the gases indicated by the flowmeters? \_\_\_\_ (Y)
- 6.6.1.2 Is the gauge closest to the table top for cylinder supply pressure? \_\_\_\_ (Y)
- 6.6.1.3 Bleed all pressure from the cylinder circuit.
- 6.6.1.4 Are the cylinder gauges at zero (0) PSI? \_\_\_\_ (Y)
- 6.6.1.5 Open the cylinder valves.
- 6.6.1.6 Do the cylinder pressure gauges respond properly? \_\_\_\_ (Y)
- 6.6.1.7 Are the gauges labeled "Non-Magnetic"? \_\_\_\_ (Y)

### 6.6.2 Pipeline Gauges

- 6.6.2.1 Are the gauges below the flowmeters for pipeline supply pressure? \_\_\_\_ (Y)
- 6.6.2.2 Are the pipeline pressure gauges at zero (0) PSI? \_\_\_\_ (Y)
- 6.6.2.3 Connect the pipeline supply.
- 6.6.2.4 Do the pipeline pressure gauges respond properly? \_\_\_\_ (Y)
- 6.6.2.5 Are the correct gas identification labels affixed at each of the pipeline inlets? \_\_\_\_ (Y)
- 6.6.2.6 Does the back panel identify each of the pipeline inlets properly? \_\_\_\_ (Y)
- 6.6.2.7 Are the gauges labeled "Non-Magnetic"? \_\_\_\_ (Y)

## **6.7 Oxygen Supply Failure Protection**

### **6.7.1 Nitrous Oxide O.F.P. Device**

- 6.7.1.1 Disconnect the pipeline supplies.
- 6.7.1.2 Open and close the oxygen cylinder valve.
- 6.7.1.3 Open the nitrous oxide cylinder valve.
- 6.7.1.4 Set the O<sub>2</sub> and N<sub>2</sub>O flows to 4 l/min.
- 6.7.1.5 Does the flow of nitrous oxide cease when the oxygen pressure is depleted? \_\_\_\_ (Y)
- 6.7.1.6 Connect the O<sub>2</sub> pipeline supply.
- 6.7.1.7 Close the nitrous oxide cylinder valve and bleed the pressure from the circuit.
- 6.7.1.8 Connect the N<sub>2</sub>O pipeline supply.
- 6.7.1.9 Disconnect the O<sub>2</sub> pipeline supply.
- 6.7.1.10 Does the flow of nitrous oxide cease when the oxygen pressure is depleted? \_\_\_\_ (Y)
- 6.7.1.11 Close the nitrous oxide flow control valve.

### **6.7.2 Air O.F.P. Device - If Applicable**

- 6.7.2.1 Connect the air pipeline supply.
- 6.7.2.2 Open one (1) oxygen cylinder valve.
- 6.7.2.3 Set the air flow to 4 l/min; set the oxygen flow to 4 l/min.
- 6.7.2.4 Close the oxygen cylinder valve.
- 6.7.2.5 Does the flow of air cease when the oxygen pressure is depleted? \_\_\_\_ (Y)
- 6.7.2.6 Close the air flow control valve.



### 6.7.3 Oxygen Supply Pressure Alarm

- 6.7.3.1 If not already connected, connect a dedicated O<sub>2</sub> test gauge to the TEE fitting in the O<sub>2</sub> regulator output line.
- 6.7.3.2 Open and close an oxygen cylinder.
- 6.7.3.3 Set the oxygen flow to 2 l/min.
- 6.7.3.4 What is the pressure on the dedicated O<sub>2</sub> test gauge when the "O<sub>2</sub> SUPPLY PRESSURE" LED turns on? \_\_\_\_ PSI (34-40)
- 6.7.3.5 Close the flow control valve.
- 6.7.3.6 Remove the test gauge from the TEE fitting in the O<sub>2</sub> regulator output line and replace the plug.

## 6.8 Flowmeter Test

### 6.8.1 Oxygen Flowmeter Test

- 6.8.1.1 Open the O<sub>2</sub> cylinder valve.
- 6.8.1.2 Is it possible to adjust the flow of oxygen over the full range of the flowmeters? \_\_\_\_ (Y)
- 6.8.1.3 Close the O<sub>2</sub> cylinder valve and bleed the pressure.
- 6.8.1.4 Connect the O<sub>2</sub> pipeline supply.
- 6.8.1.5 Is the correct flow control knob and label attached to the oxygen flow control valve? \_\_\_\_ (Y)
- 6.8.1.6 Close the oxygen flow control valve.
- 6.8.1.7 What is the minimum flow of oxygen? \_\_\_\_ ml (100-200) ml/min

### 6.8.2 Nitrous Oxide Flowmeter Test

- 6.8.2.1 Set the oxygen flow to 4 l/min.
- 6.8.2.2 Open the nitrous oxide cylinder valve.
- 6.8.2.3 Is it possible to adjust the flow of nitrous oxide over the full range of the flowmeter? \_\_\_\_ (Y)

- 6.8.2.4 Close the nitrous oxide cylinder valve and bleed the pressure.
- 6.8.2.5 Connect the N<sub>2</sub>O pipeline supply.
- 6.8.2.6 Is the correct flow control knob and label attached to the N<sub>2</sub>O flow control valve? \_\_\_\_ (Y)
- 6.8.2.7 Close the oxygen and nitrous oxide flow control valves.
  
- 6.8.3 Air Flowmeter Test
  - 6.8.3.1 Connect the Air pipeline supply (if applicable) and verify operation of the air flowmeter.
  - 6.8.3.2 Close the air flow control valve and disconnect the Air pipeline supply.
  - 6.8.3.3 Is the correct flow control knob and label attached to the air flow control valve? \_\_\_\_ (Y)
  
- 6.8.4 Auxiliary Oxygen Flowmeter Test - If Applicable
  - 6.8.4.1 Close the flowmeter flow control valve.
  - 6.8.4.2 Connect a cm H<sub>2</sub>O pressure manometer to the outlet.
  - 6.8.4.3 Is there an increase in pressure? \_\_\_\_ (N)
  - 6.8.4.4 Remove the gauge and test fixture.
  - 6.8.4.5 Is it possible to adjust the flow over the full range of the flowmeter? \_\_\_\_ (Y)
  - 6.8.4.6 Set the flow rate to 5 l/min.
  - 6.8.4.7 Hold the sensor from a calibrated O<sub>2</sub>Med at the flowmeter outlet.
  - 6.8.4.8 After 90 seconds, what is the oxygen concentration? \_\_\_\_ % (97-100)
  - 6.8.4.9 Remove the O<sub>2</sub>Med sensor.
  - 6.8.4.10 Close the flowmeter flow control valve.

## 6.9 Freshgas Leak Test

- 6.9.1 Turn the System Power switch to STANDBY.
- 6.9.2 Remove the 15 mm connector from the FRESHGAS OUTLET.
- 6.9.3 Is the common gas outlet assembly in good condition? \_\_\_\_ (Y)
- 6.9.4 Connect a digital pressure manometer and Fresh Gas Leak Test Device to the freshgas outlet.
- 6.9.5 Apply 50 cm H<sub>2</sub>O of pressure to the system.
- 6.9.6 After thirty (30) seconds, what is the pressure on the manometer? \_\_\_\_ (>40 cm H<sub>2</sub>O)
- 6.9.7 Turn on the left mounted vaporizer to the first graduated marking.
- 6.9.8 Apply 50 cm H<sub>2</sub>O of pressure to the system.
- 6.9.9 After thirty (30) seconds, what is the pressure on the manometer? \_\_\_\_ (>40 cm H<sub>2</sub>O)
- 6.9.10 Turn off the vaporizer.
- 6.9.11 Remove the test equipment from the Fresh Gas Outlet.
- 6.9.12 Turn the System Power switch to ON.
- 6.9.13 Open the O<sub>2</sub> flow control valve to 5 l/min., purge the system for 5 seconds, then close the O<sub>2</sub> flow control valve.
- 6.9.14 Turn the System Power switch to STANDBY.
- 6.9.15 Connect the 15 mm connector from the breathing system.
- 6.9.16 Is the FRESHGAS OUTLET label on the freshgas outlet? \_\_\_\_ (Y)

## 6.10 Absorber System

### 6.10.1 Absorber System Inspection

6.10.1.1 Remove the inspiratory and the expiratory valve domes.

6.10.1.2 Is there a broken or bent pin on the valve assembly?

Inspiratory \_\_\_ (N)    Expiratory \_\_\_ (N)

6.10.1.3 Is there a broken pin on the valve domes?

Inspiratory \_\_\_ (N)    Expiratory \_\_\_ (N)

6.10.1.4 Is the valve disc in good condition?

Inspiratory \_\_\_ (Y)    Expiratory \_\_\_ (Y)

6.10.1.5 Are the valve dome washers in good condition? \_\_\_ (Y)

6.10.1.6 Reinstall the inspiratory and expiratory valve domes.

6.10.1.6A Remove the ultrasonic flow sensor connector hose - if applicable.

6.10.1.6B Is the connector hose, connector, and O-ring in good condition? \_\_\_  
(Y) - if applicable.

6.10.1.6C Remove the ultrasonic flow sensor from the mounting bracket - if  
applicable.

6.10.1.6D Remove the flow housing/transducer assembly from the electronics  
housing - if applicable.

6.10.1.6E Remove both transducers from the flow housing; examine each O-  
ring and condition of all components, then reassemble - if  
applicable.

6.10.1.7 Remove the inspiratory and expiratory valve assemblies.

6.10.1.8 Are the two (2) washers in good condition? \_\_\_ (Y)

6.10.1.9 Reinstall the inspiratory valve.

6.10.1.10A Reinstall the expiratory valve and the connector hose between the  
expiratory valve and the ultrasonic flow sensor - if applicable.

6.10.1.10 Are the two (2) spring clips on the absorber rods? \_\_\_ (Y)

6.10.1.11 Inspect the following: canisters and gaskets, dust cup and O-ring,  
condition of soda lime.

6.10.1.12 Are the canisters and dust cup in good condition? \_\_\_ (Y)

6.10.1.13 Is the cm H<sub>2</sub>O gauge at zero (0)? \_\_\_ (Y)

6.10.1.14 Verify that the gauge is labeled "Non-Magnetic."

6.10.1.15 Remove the O<sub>2</sub>Med sensor plug from the inspiratory valve dome adapter and examine the two O-rings at the bottom of the plug.

6.10.1.16 Examine the two O-rings at the bottom of the sensor.

6.10.1.17 Reinstall the O<sub>2</sub>Med sensor plug into the inspiratory valve dome adapter.

#### 6.10.2 Absorber System Leak Test

6.10.2.1 Turn the System Power switch to STANDBY.

6.10.2.2 Close all flow control valves.

6.10.2.3 Short-circuit the inspiratory and expiratory valves with a 12-inch hose.

6.10.2.4 Attach a test terminal with a cuff inflation bulb (P/N S01059) to the bag mount.

6.10.2.5 Set the Man/Auto selector valve to BAG.

6.10.2.6 Close the APL valve.

6.10.2.7 Apply 50 cm H<sub>2</sub>O pressure to the absorber system.

6.10.2.8 After 30 seconds, what is the pressure in the absorber system? \_\_\_\_ cm H<sub>2</sub>O ( $\geq 30$ )

#### 6.10.3 APL Valve Test

6.10.3.1 Open the APL valve to its stop.

6.10.3.2 Turn the SYSTEM POWER switch to ON.

6.10.3.3 Set the oxygen flow to 8 l/min.

6.10.3.4 What is the pressure on the absorber pressure gauge? \_\_\_\_ cm H<sub>2</sub>O ( $\leq 3$ )

6.10.3.5 Close the oxygen flow control valve, turn the System Power switch to STANDBY, and remove the test terminal from the bag mount.

#### 6.10.4 Absorber Flow Direction and Leak Test

##### 6.10.4.1 Expiration Valve Leak Test

6.10.4.1.1 Close the APL valve.

6.10.4.1.2 Connect a 22mm hose between the inspiration valve and the bag mount.

6.10.4.1.3 Connect a test terminal to the expiration valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable.

6.10.4.1.4 Connect a Capnomed flowmeter to the test terminal.

6.10.4.1.5 Turn the System Power switch to ON, turn up the oxygen flow until the system pressurizes to 30 cmH<sub>2</sub>O.

6.10.4.1.6 Verify that the value indicated on the flowmeter is \_60ml/min.

6.10.4.1.7 Remove all test equipment, and turn the System Power switch to STANDBY.

##### 6.10.4.2 Inspiratory valve leak test

6.10.4.2.1 Connect a test terminal to the inspiratory valve.

6.10.4.2.2 Connect a tee adapter and calibrated pressure meter to the test terminal.

6.10.4.2.3 Connect a pressure bulb to the open port of the tee adapter.

6.10.4.2.4 Connect another test terminal to the bag connector.

6.10.4.2.5 Connect a Capnomed flowmeter to the test terminal on the bag mount.

6.10.4.2.6 Pressurize the system to 30 cmH<sub>2</sub>O.

6.10.4.2.7 Verify that the flow meter indicates \_60 ml/min.

6.10.4.2.8 Remove all test equipment.

6.10.4.2.9 Open the APL valve.

**6.10.4.3 Flow Direction Test**

- 6.10.4.3.1 Attach a breathing circuit with a 3-liter bag at the Y-piece to the inspiration valve and expiration valves or the expiratory hose terminal on the ultrasonic flow sensor, if applicable.
- 6.10.4.3.2 Attach a 3-liter bag to the swivel bag mount.
- 6.10.4.3.3 Turn the System Power switch to ON.
- 6.10.4.3.4 Set the O<sub>2</sub> flow to 4 l/min.
- 6.10.4.3.5 Inflate the simulated lung by briefly using the O<sub>2</sub> Flush.
- 6.10.4.3.6 Partially close the APL valve.
- 6.10.4.3.7 Squeeze the breathing bag attached to the bag mount at a rate of approximately 10 BPM. Readjust the APL valve if required to properly ventilate the simulated lung.
- 6.10.4.3.8 Observe the operation of each unidirectional valve disc at eye level and make sure the inspiratory valve disc raises only during the inspiration phase, and the expiratory valve raises only during the exhalation phase. Watch the valves until satisfied that both valves operate correctly, and move freely without sticking.
- 6.10.4.3.9 Open the APL valve.

### 6.10A Bain Circuit Adapter - if applicable

- 6.10A.1 Close the APL valve by turning the knob fully clockwise.
- 6.10A.2 Insert the O<sub>2</sub> sensor plug into the O<sub>2</sub> sensor inlet on the Bain Circuit.
- 6.10A.3 Attach a test terminal with a cuff inflation bulb (P/N S010159) to the Breathing Bag port on the Bain Circuit.
- 6.10A.4 Attach a cmH<sub>2</sub>O digital pressure meter to the female quick connect connection on the Bain Circuit.
- 6.10A.5 Occlude the expiration port on the Bain Circuit.
- 6.10A.6 Apply 50cmH<sub>2</sub>O to the Bain Circuit via test terminal and inflation bulb.
- (✓) 6.10A.7 After 30 seconds, what is the pressure on the cmH<sub>2</sub>O digital pressure meter? (45 to 50 cmH<sub>2</sub>O)
- 6.10A.8 Verify that the pressure indicated on the cmH<sub>2</sub>O gauge is within 3 cmH<sub>2</sub>O of the digital pressure meter reading.
- 6.10A.9 Open the APL valve by turning the knob fully counter-clockwise.
- 6.10A.10 Connect a test hose from the fresh gas outlet to the Expiration port of the Bain Circuit.
- 6.10A.11 Set the O<sub>2</sub> flow to 10 L/min.
- (✓) 6.10A.12 What is the pressure on the cmH<sub>2</sub>O digital pressure meter? ( \_ 3 cmH<sub>2</sub>O)
- 6.10A.13 Verify that the pressure indicated on the cmH<sub>2</sub>O gauge is within 3 cmH<sub>2</sub>O of the digital pressure meter reading.
- 6.10A.14 Remove the test terminal and inflation bulb from the Breathing Bag port.
- 6.10A.15 Return all controls to their original positions.



### 6.10B Vapor Exclusion System (if applicable)

- 6.10B.1 Set all vapors to (0).
- 6.10B.2 Adjust the handwheel on the upper vapor (viewed from the front of the machine) to any concentration above zero (0).
- 6.10B.3 Is it possible to adjust the lower vapor? \_\_\_\_ (N)
- 6.10B.4 Set the handwheel on the upper vapor to zero (0).
- 6.10B.5 Adjust the handwheel on the lower vapor to any concentration above zero (0).
- 6.10B.6 Is it possible to adjust the upper vapor? \_\_\_\_ (N)
- 6.10B.7 Return the handwheel on the lower vapor to zero (0).

## **6.11 Flow and Pressure Calibration: Core-M Monitor**

NOTE: A "FLOW CAL" message must appear on the display prior to continuing with testing. This message appears after the 15 minute warm up period has completed.

6.11.1 Deleted

6.11.2 Verify that a flow sensor is attached to the volume sensor pilot line.

6.11.3 Remove the flow sensor from the absorber system.

6.11.4 Press the "FLOW CAL" key with the flow sensor exposed to room atmosphere.

6.11.5 Verify that the flow calibration has successfully completed.

### 6.11A Flow and Pressure Calibration: VPO Monitor

- 6.11A.1 To bring up the Oxygen Monitor Service Screen, press the Mon Cal key.
  - 6.11A.2 Remove the oxygen sensor from the valve dome adapter, and remove the oxygen sensor capsule from the oxygen sensor housing.
  - (✓) 6.11A.3 When the CURRENT CELL A and CURRENT CELL B readings have stabilized, press the ZERO key and verify that the new offset values are stored.
- NOTE: The higher the offset, the higher the calculated oxygen concentration appears at high concentrations.
- 6.11A.4 Put the oxygen sensor capsule into the oxygen sensor housing.
  - 6.11A.5 Press the PRESS MON key.
  - 6.11A.6 Disconnect the Baromed breathing pressure sensor line from the absorber and expose it to air.
  - 6.11A.7 Let the Current Pressure Value stabilize and press the ZERO key to store the value.
  - 6.11A.8 Connect a test fixture and a calibrated digital pressure manometer to the breathing pressure sensor line.
  - 6.11A.9 Pressurize the circuit to 50 cm H<sub>2</sub>O and allow the Current Value to stabilize.
  - (✓) 6.11A.10 Press the SPAN key and verify that the new span values are stored.
  - 6.11A.11 Release the pressure, disconnect the manometer and test fixture, and reconnect the breathing pressure sensor line to the absorber.
  - 6.11A.12 Press EXIT to return to the Main Service screen.
  - 6.11A.13 Press EXIT to return to normal operation.

## 6.12 Oxygen Cal and Alarm Test: Core-M Monitor

- 6.12.1 Expose the O<sub>2</sub> sensor to room air.
- 6.12.2 Press the "O<sub>2</sub>" key on the monitor.
- 6.12.3 Press the "21% O<sub>2</sub> CAL" key for 3 seconds.
- 6.12.4 What is the oxygen concentration? \_\_\_\_% (20-22)
- 6.12.5 Set the oxygen low alarm limit to 30, and press the O<sub>2</sub> monitor key.
- 6.12.6 Verify that the "O<sub>2</sub> LO LMT" and "Hi Alert" audible and visual alarms activate within 5 seconds.
- 6.12.7 Press the Alarm Silence key and verify that the audible alarm stops.
- 6.12.8 Set the oxygen low alarm limit to 18.
- 6.12.9 Place the sensor into the valve dome, set the oxygen flow to 4 l/min., set the Man/Auto selector to BAG, close the APL valve, attach a 12 inch hose to the inspiratory valve and occlude the bag mount. Press the O<sub>2</sub> Flush button for 5 seconds.
- 6.12.10 Allow a few moments for the sensor to purge, and press the "100% CAL" key.
- 6.12.11 What is the oxygen concentration? \_\_\_\_% (97 to 100)
- 6.12.12 Set the oxygen high alarm limit below 100, and press the O<sub>2</sub> monitor key.
- 6.12.13 Verify that the "O<sub>2</sub> HI LMT" and "Low Alert" audible and visual alarms activate within 5 seconds.
- 6.12.14 Set the oxygen high limit to 100 (blank equals 100) and restore all controls to their original positions.

## 6.12A O2 MED: VPO Monitor

6.12A.1 Disconnect the oxygen sensor cable from the Oxygen Sensor interface.

6.12A.2 The following message shall appear on the display: O2 SENS DISC.

6.12A.3 Reconnect the O<sub>2</sub> Med sensor.

6.12A.4 The following message shall appear on the display: CAL O2 SENSOR.

6.12A.5 Press the Cal key.

NOTE: Make sure that the sensor has stabilized in ambient air for several minutes.

(✓) 6.12A.6 After calibration is completed, what is the oxygen concentration? \_\_\_\_ %  
(21)

6.12A.7 This step intentionally left blank.

6.12A.8 The warning INSP O2 LOW shall appear on the display and the warning heading shall be flashing. There shall be a continuous audible alarm.

6.12A.9 What is the low oxygen alarm default? \_\_\_\_ % (30)

6.12A.10 This step intentionally left blank.

6.12A.11 Select the OXYGEN LOW alarm limit. Does a box appear around the low alarm limit? \_\_\_\_ (Y)

6.12A.12 Verify that the low alarm limit has a range from 18 to 99%.

6.12A.13 Place the oxygen sensor into the inspiratory valve dome adapter, set the Man/Auto selector BAG, close the APL valve. Attach a 12-inch hose to the inspiratory valve and occlude the bag mount.

6.12A.14 Set the oxygen flow to 4 l/min.

6.12A.15 Set the low limit to 18, and verify that the INSP O2 LOW message has cleared.

6.12A.16 Select the OXYGEN HIGH alarm limit. Does a box appear around the high alarm limit? \_\_\_\_ (Y)

6.12A.17 What is the high oxygen alarm default? \_\_\_\_ % (100)

- 6.12A.18 Verify that the high alarm limit has a range from 100 to 19%.
- 6.12A.19 Set the high alarm limit to 95.
- 6.12A.20 The message INSP O2 HIGH shall appear as an Advisory.
- 6.12A.21 Return the high alarm limit to 100.
- 6.12A.22 The INSP O2 HIGH message shall disappear.
- (✓) 6.12A.23 Within 3 minutes, what is the oxygen concentration? \_\_\_\_ % (97-100)

### 6.13 Pressure Accuracy Test: Core-M Monitor

- 6.13.1 Interconnect the inspiratory and expiratory valves with a 12 inch hose with 22 mm ends (P/N 9995112).
- 6.13.2 Connect a pressure meter to the breathing pressure pilot line fitting on the absorber.
- 6.13.3 Attach a test terminal (P/N 4104389) with a cuff inflation bulb and hose assembly (P/N 4109398) to the bag mount.
- 6.13.4 Set the Man/Auto selector valve to BAG, and close the APL valve.
- 6.13.5 Press the PRES key on the monitor.
- 6.13.6 Pressurize the system to 30 cmH<sub>2</sub>O on the pressure meter.
- 6.13.7 Depressurize the absorber system and verify that the monitor display indicates 28 to 32 cmH<sub>2</sub>O.
- 6.13.8 Set the Pressure Hi Limit to 50, and press the PRES key on the monitor.
- 6.13.9 Pressurize the system above 50 cmH<sub>2</sub>O on the pressure meter and verify that the pressure "Hi Limit" and "Hi Alert" audible and visual alarms activate within 5 seconds.
- 6.13.10 Remove the pressure meter from the absorber system, and disable all alarms by pressing the APNEA STBY key.

### 6.13A BAROMED: VPO Monitor

- 6.13A.1 Disconnect the breathing pressure sensor line from the absorber.
- 6.13A.2 Connect a test pressure gauge and syringe to the breathing pressure sensor line.
- 6.13A.3 Select the THRESHOLD PRES alarm limit. Does a number appear to the left of the threshold line on the waveform? \_\_\_\_ (Y).
- 6.13A.4 What is the threshold alarm default? \_\_\_\_ cm H<sub>2</sub>O (12)
- 6.13A.5 Verify that the threshold alarm limit has a range from 5 to 30 cm H<sub>2</sub>O.
- 6.13A.6 Adjust the threshold to 10 cm H<sub>2</sub>O.
- 6.13A.7 Select the PRESSURE HIGH alarm limit. Does a box shall appear around the High Pressure Alarm Limit? \_\_\_\_ (Y)
- 6.13A.8 What is the high alarm limit default? \_\_\_\_ cm H<sub>2</sub>O (50)
- 6.13A.9 Verify that the high alarm limit has a range from 30 to 120 cm H<sub>2</sub>O.
- 6.13A.10 Set the high alarm limit to 65 cm H<sub>2</sub>O, and exit from the set up menu.
- 6.13A.11 Increase the pressure to 25 cm H<sub>2</sub>O, then decrease the pressure to 20 cm H<sub>2</sub>O. (You must perform this step within 10 seconds, otherwise a continuing pressure condition will prevail and will prevent completion of the test.)
- 6.13A.12 Does the THRESHOLD LOW message appear in the Advisory column? \_\_\_\_ (Y)
- 6.13A.13 Set the Man/Auto valve to AUTO, and turn the ventilator ON.
- 6.13A.14 Bleed the pressure and start a stopwatch.

NOTE:Apnea Pressure alarm times are valid only with ventilator ON.

- (✓) 6.13A.15 What is the time when APNEA-PRESSURE appears in the Caution column? \_\_\_\_ sec (13-17)
- (✓) 6.13A.16 What is the time when the APNEA-PRESSURE appears in the Warning column? \_\_\_\_ sec (26-34)
- 6.13A.17 After the APNEA-PRESSURE alarm is displayed as a Warning, slowly increase the test pressure.



- (✓) 6.13A.18 At what pressure does the APNEA-PRESSURE alarm deactivate? \_\_\_\_ cm H<sub>2</sub>O (7-13)
- 6.13A.19 Adjust the threshold to 18 cm H<sub>2</sub>O.
- 6.13A.20 Increase the pressure to 20 cm H<sub>2</sub>O, maintain the pressure, and start a stopwatch.
- (✓) 6.13A.21 What is the time when CONTINUOUS PRES appears as a Warning? \_\_\_\_ sec (12-18)
- (✓) 6.13A.22 Decreasing the pressure slowly, what is the pressure at which the CONTINUOUS PRES alarm deactivates? \_\_\_\_ cm H<sub>2</sub>O (15-21)
- 6.13A.23 Slowly increase the pressure.
- (✓) 6.13A.24 At what pressure does the VENT PRESSURE HI alarm activate? \_\_\_\_ cm H<sub>2</sub>O (62-68)
- 6.13A.25 Bleed the pressure.
- 6.13A.26 Slowly create a sub-atmospheric pressure.
- (✓) 6.13A.27 At what pressure does the SUB ATM PRESSURE alarm activate? \_\_\_\_ cm H<sub>2</sub>O (-7 to -13)
- 6.13A.28 Disconnect the test gauge and syringe; reconnect the breathing pressure sensor line to the absorber.
- 6.13A.29 Does the SUB ATM PRESSURE alarm deactivate? \_\_\_\_ (Y)
- 6.13A.30 Press the Breathing Pressure OFF key.
- 6.13A.31 Verify that the APNEA ALARM cannot be selected to OFF when the ventilator switch is ON.

## **6.14 Apnea and Volume Alarm Test: Core-M Monitor**

- 6.14.1 Attach a patient circuit with a 3L breathing bag to the absorber system.
- 6.14.2 Insert a test minute volumeter between the flow sensor and the expiratory valve.
- 6.14.3 Set the Man/Auto selector to AUTO.
- 6.14.4 Set the ventilator FREQUENCY to 10 BPM.
- 6.14.5 Set the I:E RATIO to 1:2.
- 6.14.6 Set the Tidal Volume to 1000 ml.
- 6.14.7 Adjust the O<sub>2</sub> flow to 500 ml/min.
- 6.14.8 Inflate the bellows by momentarily pressing the O<sub>2</sub> Flush button.
- 6.14.9 Turn the ventilator ON and allow the ventilator to cycle.
- 6.14.10 Turn the ventilator OFF and start a timer.
- 6.14.11 What is the time when the "APNEA VOL" and "Mid Alert" audible and visual alarms activate? \_\_\_sec (13 to 17)
- 6.14.12 What is the time when the "APNEA VOL" and "Hi Alert" audible and visual alarms activate? \_\_\_sec (26 to 34)
- 6.14.13 Turn the ventilator ON.
- 6.14.14 Does the "APNEA VOL" alarm deactivate? (Y)
- 6.14.15 Press the MIN VOL key and set the minute volume low limit above the current displayed value.
- 6.14.16 Press the MIN VOL key and verify that the "MINUT LOW" and "Low Alert" audible and visual alarms activate within 13 to 17 seconds.
- 6.14.17 Adjust the MIN VOL LO limit to the original setting.

- 6.14.18 Adjust the MIN VOL HI limit below the current displayed value.
- 6.14.19 Press the MIN VOL key and verify that the "MINUT HI" and "Mid Alert" audible and visual alarms activate within 13 to 17 seconds.
- 6.14.20 Adjust the MIN VOL HI limit to the original setting.
- 6.14.21 Are the displayed minute volumes on the monitor and test volumeter within 15% of each other? (Y)
- 6.14.22 Press the TIDAL VOL key and set the tidal volume low limit above the current displayed value.
- 6.14.23 Press the TIDAL VOL key and verify that the "TIDAL LOW" and "LOW ALERT" audible and visual alarms activate within 5 seconds.
- 6.14.24 Adjust the tidal volume low limit to the original position.
- 6.14.25 Press the TIDAL VOL key and set the tidal volume high limit below the current displayed value.
- 6.14.26 Press the TIDAL VOL key and verify that the "TIDAL HI" and "HI ALERT" audible and visual alarms activate within 5 seconds.
- 6.14.27 Adjust the tidal volume high limit to the original position.
- 6.14.28 Are the displayed tidal volumes on the monitor and test volumeter within 15% of each other? (Y)
- 6.14.29 Press the RR key and verify that the monitor displays a respiratory rate of 9 to 11 BPM.
- 6.14.30 Adjust the RR HI limit below the current displayed respiratory rate.
- 6.14.31 Press the RR key and verify that the "RATE ALRM" and "Hi Alert" audible and visual alarms activate within 13 to 17 seconds.
- 6.14.32 Adjust the RR HI limit to 60 BPM.
- 6.14.33 Remove the test volumeter.

#### 6.14A Ultrasonic Flow Sensor: VPO Monitor

- 6.14A.1 Press the Breathing Volume LOW LIMIT key. Does a box appear around the Minute Volume Alarm Limit? \_\_\_\_ (Y)
- 6.14A.2 What is the low minute volume alarm default? \_\_\_\_ (1.0)
- 6.14A.3 Verify that the minute volume has a low alarm limit range from at least 0.2 to 10.0 by increments of 0.1.
- 6.14A.4 Adjust the low minute volume alarm to 2.0 liters. Turn on the ventilator (with the breathing circuit open) and start a stop watch.
- 6.14A.5 This step intentionally left blank.
- (✓) 6.14A.6 What is the time when APNEA-VOLUME appears as a Caution? \_\_\_\_ sec (26-34)
- (✓) 6.14A.7 What is the time when APNEA-VOLUME appears as a Warning? \_\_\_\_ sec (52-68)
- (✓) 6.14A.8 Within one (1) minute, does the MINUTE VOLUME LOW message appear as a Caution? \_\_\_\_ Y
- 6.14A.9 Insert a test minute volumeter in between the absorber and the exhalation valve.
- 6.14A.10 Reconnect the ventilator hose to the Ventilator Hose terminal.
- 6.14A.11 Adjust the FREQUENCY to 6 BPM.
- 6.14A.12 Adjust the I:E RATIO to 1:2.
- 6.14A.13 Adjust the flow to the maximum of the LOW zone.
- 6.14A.14 Adjust the oxygen flow to 2 l/min.
- 6.14A.15 Adjust the Tidal Volume to 200 ml.

- 6.14A.16 After the first breath is detected, do the APNEA-VOLUME Warning message and the MINUTE VOLUME LO Caution message deactivate? \_\_\_\_ (Y)
- 6.14A.17 Adjust the low alarm limit above the indicated minute volume.
- 6.14A.18 Does the MINUTE VOLUME LO message appear as a Caution? \_\_\_\_ (Y)
- 6.14A.19 Adjust the low alarm limit below the indicated minute volume.
- 6.14A.20 Does the MINUTE VOLUME LO Caution message deactivate? \_\_\_\_ (Y)
- 6.14A.21 Increase the tidal volume to 1000 ml and the frequency to 10 BPM.
- 6.14A.22 Press the O<sub>2</sub> Flush momentarily to inflate the bellows.
- 6.14A.23 Readjust the inspiratory flow as necessary to fully collapse the bellows.
- (✓) 6.14A.24 Are the tidal and minute volumes on the machine and on the test volumeter within 20% of each other? \_\_\_\_ (Y)
- 6.14A.25 Create a reverse flow by loosening the expiratory valve dome. Remove the breathing hose from the flow sensor. Connect a test terminal and a Riken aspirator (negative pressure squeeze bulb) to the 22 mm male port of the flow sensor. Disconnect the hose attached to the exhalation valve. Compress and release the aspirator.
- (✓) 6.14A.26 Each time a reverse flow greater than 20 ml is detected, does the REVERSE FLOW message appear as an Advisory? \_\_\_\_ (Y)
- 6.14A.27 Tighten the expiratory valve dome. Remove the test terminal and aspirator from the flow sensor and reconnect the patient circuit hose. Reconnect the hose between the expiratory valve and the flow sensor.
- 6.14A.28 Disconnect the respiratory volume sensor cord from the VOLUME SENSOR interface.
- 6.14A.29 Do the VOL SENSOR DISC appear as an Advisory, and is LED illuminated in the Breathing Volume OFF key? \_\_\_\_ (Y)
- 6.14A.30 Connect the respiratory volume sensor cord to the VOLUME SENSOR interface and verify that the alarms clear.

## **6.15 Ventilator Test**

- 6.15.1 Set the Man/Auto selector to BAG.
- 6.15.2 Set the FREQUENCY to 10 BPM.
- 6.15.3 Set the I:E RATIO to 1:2.
- 6.15.4 Set the Tidal Volume to 1000 ml.
- 6.15.5 Attach a patient circuit to the absorber system.
- 6.15.6 Adjust the O<sub>2</sub> flow to 3 l/min.
- 6.15.7 Turn the ventilator on.
- 6.15.8 Verify the FAULT indicator turns on (Y)
- 6.15.9 Set the Man/Auto selector switch to AUTO.
- 6.15.10 Verify the FAULT indicator turns off (Y)
- 6.15.11 Adjust the INSPIRATORY FLOW to the maximum of the LOW zone.
- 6.15.12 Occlude the Y-piece with your thumb.
- 6.15.13 What is the peak inspiratory pressure? \_\_\_\_ cm H<sub>2</sub>O (>30 cm H<sub>2</sub>O)
- 6.15.14 Attach a 3-liter bag to the Y-piece.
- 6.15.15 Using a stopwatch, time the inspiratory phase.
- 6.15.16 What is the inspiratory time? \_\_\_\_ seconds (1.8 - 2.2)
- 6.15.17 Using a stopwatch, time the expiratory phase.
- 6.15.18 What is the expiratory time? \_\_\_\_ seconds (3.6 - 4.4)
- 6.15.19 Press and hold the EXTENDED RANGE switch and scroll the I:E ratio dial counter clockwise and verify the extended I:E ratio values increment (2:1, 3:1 and 4:1); return the I:E ratio to 2:1.
- 6.15.20 Using a stopwatch, time the inspiratory phase.

- 6.15.21 What is the inspiratory time? \_\_\_\_ seconds (3.6 - 4.4)
- 6.15.22 Using a stopwatch, time the expiratory phase.
- 6.15.23 What is the expiratory time? \_\_\_\_ seconds (1.8 - 2.2)
- 6.15.24 Adjust the FREQUENCY and I:E RATIO through the following settings and verify that the ventilator cycles properly:

<u>FREQ.</u>	<u>I:E RATIO</u>	<u>FREQ.</u>	<u>I:E RATIO</u>
11	1:1	66	1:3.5
22	1:1.5	77	1:4
33	1:2	88	1:4.5
44	1:2.5	99	1:4.5
55	1:3		

#### **6.16 Bellows Drive Gas Leak Test**

- 6.16.1 Remove the ventilator hose from the VENTILATOR HOSE terminal on the bellows.
- 6.16.2 Attach a test terminal to the bellows assembly ventilator hose terminal.
- 6.16.3 Connect a flowmeter test stand (P/N S000081) to the test terminal.
- 6.16.4 Set the FREQUENCY to 1 BPM.
- 6.16.5 Set the I:E RATIO to 1:1.
- 6.16.6 Set the INSPIRATORY FLOW to the maximum.
- 6.16.7 Turn the ventilator on.
- 6.16.8 What is the flow that is indicated during the inspiratory phase? \_\_\_\_ (<50 ml)
- 6.16.9 Remove the test terminal and flowmeter test stand. Reconnect the ventilator hose to the VENTILATOR HOSE terminal.

### **6.17 "F" Bellows Test**

- 6.17.1 Set the FREQUENCY to 10 BPM.
- 6.17.2 Set the I:E RATIO to 1:2.
- 6.17.3 Adjust the O<sub>2</sub> flow to 300 ml.
- 6.17.4 Adjust the INSPIRATORY FLOW to MED.
- 6.17.5 Adjust the Tidal Volume to 200 ml.
- 6.17.6 What is the Tidal Volume on the Omicron monitor? \_\_\_\_ ml (125-250)
- 6.17.7 Adjust the Tidal Volume to 1000 ml.
- 6.17.8 What is the Tidal Volume on the Omicron monitor? \_\_\_\_ ml (900-1100)
- 6.17.9 Adjust the INSPIRATORY FLOW to HIGH.
- 6.17.10 Adjust the O<sub>2</sub> flow to 5 l/min.
- 6.17.11 Adjust the Tidal Volume to maximum.
- 6.17.12 What is the Tidal Volume on the Omicron monitor? \_\_\_\_ ml (\_1400)

### **6.18 Ventilator Relief Valve Test**

- 6.18.1 Adjust the O<sub>2</sub> flow to 10 l/min.
- 6.18.2 Adjust the INSPIRATORY FLOW to MED.
- 6.18.3 Adjust the I:E RATIO to 1:3, and the FREQUENCY to 10.
- 6.18.4 Adjust the Tidal Volume to 1200 ml.
- 6.18.5 What is the PEEP? \_\_\_\_ cm H<sub>2</sub>O (≤3)
- 6.18.6 Adjust the O<sub>2</sub> flow to 500 ml.



6.18.7 Does the ventilator deliver the full Tidal Volume during the inspiratory time? \_\_\_\_ (Y)

6.18.8 Does the bellows stop adjust smoothly? \_\_\_\_ (Y)

### **6.19 Inspiratory Pressure Limit Test**

6.19.1 Set the Inspiratory Flow to the middle of the medium range.

6.19.2 Set the oxygen flow rate to 4 l/min.

6.19.3 Set the Pressure Limit Control to its MIN position.

6.19.4 Occlude the Y-piece with your thumb.

6.19.5 What is the peak pressure? \_\_\_\_ cm H<sub>2</sub>O (<15)

6.19.6 Adjust the Pressure Limit Control to 30.

6.19.7 What is the peak pressure? \_\_\_\_ cm H<sub>2</sub>O (27-33)

6.19.8 Turn the pressure limit control clockwise to the MAX setting.

6.19.9 What is the peak pressure? \_\_\_\_ >40 cm H<sub>2</sub>O

6.19.10 Remove your thumb from the Y-piece.

6.19.11 Set the Inspiratory Flow to the maximum of the LOW zone.

6.19.12 Close the oxygen flow control valve.

6.19.13 Turn the ventilator OFF. NOTE: The inspiratory flow gauge will not return to the stop position when the ventilator is turned off.

### **6.20 Oxygen Concentration Test**

6.20.1 Oxygen + Nitrous Oxide Concentration Test

6.20.1.1 Turn the SYSTEM POWER switch to ON.

6.20.1.2 Disconnect the pipeline supplies

6.20.1.3 Open the APL valve.

- 6.20.1.4 Connect a 12-inch hose between the inspiratory valve and the expiratory valve.
- 6.20.1.5 Set the Man/Auto selector to BAG.
- 6.20.1.6 Occlude the bag mount.
- 6.20.1.7 Insert the sensor from a calibrated Omicron monitor into the valve dome adapter on the inspiratory valve.
- 6.20.1.8 Close all the flow control valves.
- 6.20.1.9 Open one (1) cylinder valve for each gas.
- 6.20.1.10 Depress the O<sub>2</sub> FLUSH button for 15 seconds.
- 6.20.1.11 Set the oxygen flow to 4 l/min.
- 6.20.1.12 Does the Omicron monitor read 97-100% within 3 minutes? \_\_\_\_ (Y)
- 6.20.1.13 Set the nitrous oxide flow to 2 l/min.
- 6.20.1.14 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (64-70)
- 6.20.1.15 Close the nitrous oxide flow control valve.
  
- 6.20.2 Oxygen + Air Concentration Test - If Applicable
  - 6.20.2.1 Depress the O<sub>2</sub> FLUSH button for 15 seconds.
  - 6.20.2.2 Does the Omicron monitor read 97-100% within 3 minutes? \_\_\_\_ (Y)
  - 6.20.2.3 Set the air flow to 2 l/min.
  - 6.20.2.4 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (71-77)
  - 6.20.2.5 Close the air flow control valve.

## **6.21 Oxygen Ratio Control (ORC) Test**

- 6.21.1 Open the oxygen and nitrous oxide cylinder valves.
- 6.21.2 Depress the O<sub>2</sub> FLUSH for 15 seconds.
- 6.21.3 Set the oxygen flow to 1000 ml.
- 6.21.4 Open the nitrous oxide flow control valve to the stop position.
- 6.21.5 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (21-29)
- 6.21.6 Adjust the oxygen flow to 1.5 l/min.
- 6.21.7 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (21-29)
- 6.21.8 Adjust the oxygen flow to 2 l/min.
- 6.21.9 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (21-29)
- 6.21.10 Adjust the oxygen flow to 4 l/min.
- 6.21.11 What is the oxygen concentration after 3 minutes? \_\_\_\_ % (21-29)
- 6.21.12 Reduce the O<sub>2</sub> flow to 500 ml/min. Verify that the N<sub>2</sub>O flow is greater than or equal to 600 ml/min.
- 6.21.13 Slowly close the oxygen flow control valve.
- 6.21.14 What is the oxygen concentration with the O<sub>2</sub> flow control valve closed?  
\_\_\_\_% (>21%)
- 6.21.15 What is the flow of nitrous oxide? \_\_\_\_ ml/min. (375-750 ml/min.)
- 6.21.16 Close the nitrous oxide flow control valve.

## 6.22 Oxygen Flush and 100% O<sub>2</sub> Final Test

- 6.22.1 Close the nitrous oxide cylinder valve.
- 6.22.2 Turn the SYSTEM POWER switch to ON.
- 6.22.3 Set the oxygen flow rate to 5 l/min.
- 6.22.4 Fully open the nitrous oxide flow control valve.
- 6.22.5 After the nitrous oxide flow stops, close the N<sub>2</sub>O flow control valve.
- 6.22.6 Close the oxygen flow control valve.
- 6.22.7 Close the additional gas(es) cylinder valves.
- 6.22.8 Bleed the gas from the additional gas circuit(s).
- 6.22.9 Turn the SYSTEM POWER switch to STANDBY.
- 6.22.10 Press and release the O<sub>2</sub> FLUSH button.
- 6.22.11 Does the flow of oxygen stop immediately? \_\_ (Y)
- 6.22.12 Connect a test minute volumeter (P/N 2212300) to the common gas outlet, using the Fresh Gas Outlet Volume Test Device (P/N S010158).
- 6.22.13 Press and hold the O<sub>2</sub> FLUSH button for 6 seconds.
- 6.22.14 What is the oxygen flush flow rate? \_\_ l/min. (4.5-6.5)
- 6.22.15 Remove the test minute volumeter and test fixture, and reconnect the fresh gas hose.
- 6.22.16 Turn the SYSTEM POWER switch to ON.
- 6.22.17 Insert the calibrated sensor into the inspiratory valve dome.
- 6.22.18 Press the O<sub>2</sub> FLUSH button.
- 6.22.19 What is the O<sub>2</sub> concentration after 3 minutes? \_\_ % O<sub>2</sub> (97-100)
- 6.22.20 Remove the sensor and install the plug.
- 6.22.21 Close the oxygen cylinder valve.
- 6.22.22 Bleed the oxygen circuit by pressing the O<sub>2</sub> FLUSH button.

## 6.23 Scavenger Interface, A/C

- 6.23.1 Remove all scavenger hoses one at a time, and drain all accumulated moisture. Inspect all scavenger hoses for deterioration and replace any worn hoses.
- 6.23.2 Remove the safety relief valve housing by unscrewing it in a counterclockwise direction.
- 6.23.3 Inspect the rubber O-ring and replace if worn.
- 6.23.4 Remove the safety relief valve from its housing by twisting it out in a counterclockwise direction. The tips of needle-nose pliers can be used to turn the valve. Be careful not to damage the valve disk.
- 6.23.5 Remove any accumulated lint or dust from the valve with a soft brush. The valve may be further cleaned with a low flow of clean air or oxygen. The scavenger body can be cleaned with a moist cloth.
- 6.23.6 Reinstall the valve into the housing, making sure that it is threaded all the way into the housing and that the plastic washer is properly seated on its upper surface.
- 6.23.7 Make sure that the interior of the valve body is completely dry. Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.
- 6.23.8 Perform the following Pre-use Checkout procedure:
  - 6.23.8.1 Connect a 19 mm scavenger hose between the bottom of the absorber pole and the right-hand port on the scavenger. Connect a short 19 mm scavenger hose between the APL valve and the port on the rear of the absorber pole. Connect a 19 mm scavenger hose between the ventilator relief valve and the left-hand port on the scavenger.
  - 6.23.8.2 Connect a short 22 mm breathing hose from the inspiratory valve to the expiratory valve on the absorber.
  - 6.23.8.3 Set the Man/Auto valve to the AUTO position.
  - 6.23.8.4 Set the oxygen flow to 10 l/min. and occlude the 19 mm scavenger terminal labeled EXHAUST.

- 6.23.8.5 After the ventilator bellows inflates, the flow of oxygen will exit the system through the positive pressure safety relief valve. At this point, the absorber system breathing pressure gauge shall indicate a pressure of 10.0 cm H<sub>2</sub>O or less.

## 6.24 Open Reservoir Scavenger

- 6.24.1 Remove all scavenger hoses one at a time and drain all accumulated moisture. Inspect all scavenger hoses for deterioration and replace any worn hoses.
- 6.24.2 Disconnect the hospital vacuum source from the scavenger.
- 6.24.3 Remove the scavenger mounting screws.
- 6.24.4 Remove the two screws securing the access panel at the bottom of the scavenger canister.
- 6.24.5 Remove and inspect the silencer; replace if needed.
- 6.24.6 Remove the reservoir canister from the scavenger body by unscrewing the four socket head cap screws located at the top of the canister.
- 6.24.7 Remove the flowmeter from its housing by turning it counterclockwise. Inspect the tube and clean with compressed air if needed.
- 6.24.8 Reassemble the scavenger assembly, and reactivate the vacuum source.
- 6.24.9 Perform the following negative pressure relief test:
- 6.24.9.1 Connect a 19 mm scavenger hose between the bottom of the absorber pole and the right-hand port on the scavenger. Connect a 19 mm scavenger hose between the APL valve and the rear port on the absorber pole. The left-hand scavenger port may be capped for this test, or may be connected to the ventilator relief valve. Connect a DISS vacuum hose to the threaded terminal on the left side of the scavenger. Alternatively, an adapter can be used to attach a wall suction hose to the hose barb fitting on the adapter.
- 6.24.9.2 Connect a short 22 mm breathing hose from the inspiratory valve to the expiratory valve on the absorber. Set the Man/Auto selector valve to the BAG position. Turn the APL valve control knob fully counterclockwise.
- 6.24.9.3 Verify that the suction waste gas disposal system is active.

6.24.9.4 Adjust the scavenger needle valve until the flowmeter indicates between the white lines. Close all flow control valves on the anesthesia machine. Occlude the absorber breathing bag terminal.

6.24.9.5 Install a scavenger adapter with a hose barb between the 19 mm hose terminal of the scavenger, and the scavenger hose. Connect a test pressure monitor to the hose barb on the adapter and observe the pressure reading on the test gauge. The gauge shall indicate a pressure of 0 cm H<sub>2</sub>O.

6.24.10 Perform the following positive pressure relief test:

6.24.10.1 Connect a 19 mm scavenger hose between the bottom of the absorber pole and the right-hand port on the scavenger. Connect a 19 mm scavenger hose between the APL valve and the rear port on the absorber pole. The left-hand scavenger port may be capped for this test, or may be connected to the ventilator relief valve. Connect a DISS vacuum hose to the threaded terminal on the left side of the scavenger. Alternatively, an adapter can be used to attach a wall suction hose to the hose barb fitting on the adapter.

6.24.10.2 Connect a short 22 mm breathing hose from the inspiratory valve to the expiratory valve on the absorber. Set the Man/Auto selector valve to the BAG position. Turn the APL valve control knob fully counterclockwise.

6.24.10.3 Verify that the suction waste gas disposal system is active.

6.24.10.4 Turn the scavenger needle valve fully clockwise (closed).

6.24.10.5 Open the oxygen flow control valve on the anesthesia machine to a flow of 10 l/min. and occlude the absorber breathing bag terminal.

6.24.10.6 The flow of oxygen shall now exit the system through the relief ports around the top of the canister. The test pressure gauge shall indicate a pressure less than 1.0 cm H<sub>2</sub>O.

6.24.10.7 After the test, adjust the scavenger needle valve for a flowmeter indication halfway between the two white lines.

## 6.25 Suction Regulator (if applicable)

- 6.25.1 Verify that the suction bottle is attached to the suction regulator.
- 6.25.2 Verify that vacuum is attached to the  $\frac{3}{4}$  in. DISS vacuum connection.
- 6.25.3 Set the vacuum on/off valve to the OFF (vertical) position.
- 6.25.4 Connect a digital pressure meter to the collecting inlet stem of the suction bottle.
- 6.25.5 Set the digital pressure meter to the mmHg scale.
- 6.25.6 Turn the vacuum control knob fully counter-clockwise.
- 6.25.7 What is the vacuum indicated on the digital pressure meter? (0)
- 6.25.8 Turn the vacuum control knob fully clockwise and verify that the vacuum control knob stops.
- 6.25.9 Set the vacuum on/off valve to the ON position.
- 6.25.10 Set the regulator to indicate 250 mmHg.
- 6.25.11 What is the vacuum indicated on the digital pressure meter? (200-300 mmHg)
- 6.25.12 Return all controls to their original positions.

## 6.26 Final Check

- 6.26.1 Verify that the pipeline hoses are connected to the hospital pipeline.
- 6.26.2 Verify that the APL valve knob is turned completely counterclockwise, fully open.
- 6.26.3 Place the Auto/Man selector in the BAG position.
- 6.26.4 Verify that the oxygen sensor is removed from the valve dome adapter.
- 6.26.5 Verify that the valve dome is plugged.
- 6.26.6 Verify that the machine is plugged into a live outlet.
- 6.26.7 Return all machine controls and settings to their original state.
- 6.26.8 Carefully inspect the machine to verify that no loose screws, washers, or tools are left on or in any part of the machine.



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# **Dräger**medical

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